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GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS
PREPARATORY EXAMINATION / VOORBEREIDENDE EKSAMEN

MATHEMATICS / WISKUNDE
(Second Paper / Tweede Vraestel)

MEMORANDUM

NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.
- Om antwoorde/waardes om 'n probleem op te los, te veronderstel, word NIE toegelaat NIE.

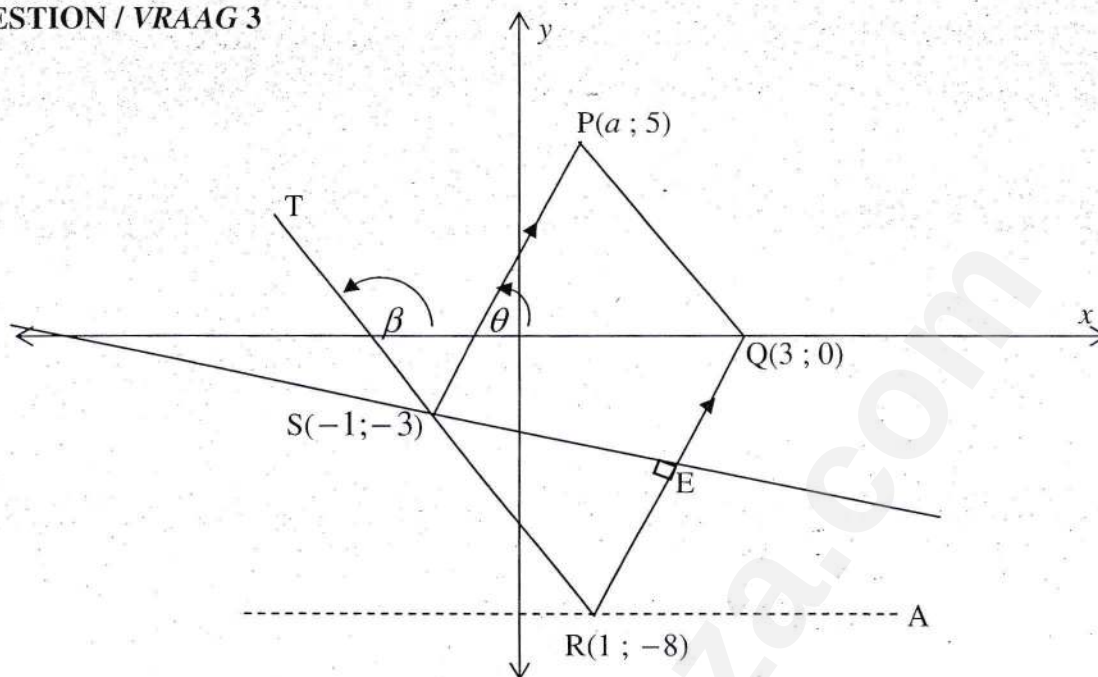
QUESTION / VRAAG 1

1.1.1	2015	✓ 2015 (1)
1.1.2	standard deviation/ <i>standaardafwyking</i> = 65,18	✓ 65,18 (2)
1.1.3	$\bar{x} = 164$ (164 – 65,18 ; 164+65,18) = (98,82 ; 229,18) $\frac{8}{12} \times 100 = 66,67\%$	✓ $\bar{x} = 164$ ✓ (98,82 ; 229,18) ✓ 66,67% (3)
1.2.1	220 – 26 = 194	✓ 194 (1)
1.2.2	skewed to the right / <i>skeef na regs</i> OR / OF positively skewed / <i>positief skeef</i>	✓ positively/skewed to the right <i>positief skeef/</i> <i>skeef na regs</i> (1)
1.2.3	(a) the mean will increase / <i>die gemiddeld sal verhoog</i> (b) the median will stay the same / <i>die mediaan sal dieselfde bly</i>	✓ mean increases ✓ median the same (2)
1.2.4	$Q_1 = 64$ which means 25% of the data lies to the left of Q_1 / <i>25% van die data lê links van Q_1</i> $25\% \times 12 \text{ years} = 3$ for 3 years / <i>vir 3 jaar</i>	✓ 25% ✓ 3 years (2) [12]

QUESTION / VRAAG 2

2.1	Scatter plot/Spreidiagram Number of pamphlets/Aantal pamflette	no marks: 0 – 3 points correctly ✓ plotting 4 – 6 points correctly ✓✓ plotting 7 – 9 points correctly geen punte: 0 – 3 punte korrek ✓ stip 4 – 6 pte korrek ✓✓ stip 7 – 9 pte korrek (2)
2.2	$y = 0,38x + 130,73$	✓ 0,38 ✓ 130,73 (2)
2.3	y-intercept at/ y-afsnit by (0 ; 130,73) point $(\bar{x}; \bar{y}) = (600; 358)$ refer to answer book / verwys na antwoordboek	✓ (0; 130,73) ✓ (600; 358) (2)
2.4	$\hat{y} = 130,73 + 0,38(200)$ OR / OF Calculator usage / sakrekenaar gebruik $= 206,73 \approx 206$ orders/bestellings $\hat{y} = 206,48$ $= 206$ orders/bestellings	✓ substitution ✓ 206 correct rounding (accept 207) (2)
		[8]

QUESTION / VRAAG 3



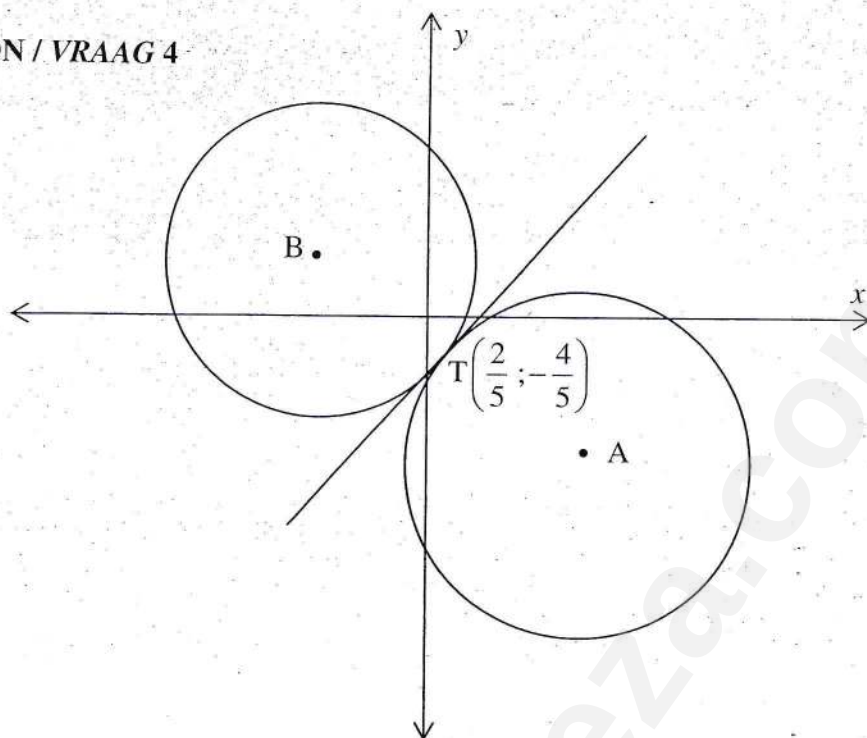
3.1	$QR = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 - 1)^2 + (0 + 8)^2}$ $= \sqrt{4 + 64}$ $= \sqrt{68}$ $= 2\sqrt{17}$ $= 8,25$	OR / OF $\sqrt{(1 - 3)^2 + (-8 - 0)^2}$ OF	✓ correct sub into distance formula / korrekte verv. in afstandsformule ✓ $2\sqrt{17}$ or 8,25 (2)
3.2	$m_{QR} = \frac{0 - (-8)}{3 - 1}$ $= \frac{8}{2}$ $= 4$	OR / OF $\frac{-8 - (0)}{1 - 3}$ $= \frac{-8}{-2}$ $= 4$	✓ subst into formula verv. in formule ✓ 4 (2)
3.3	$E\left(\frac{35}{17}; y\right)$ $m_{QR} = 4$ $\frac{y - 0}{\frac{35}{17} - 3} = 4$ $y = -\frac{64}{17}$	OR / OF $\frac{y - (-8)}{\frac{35}{17} - 1} = 4$	✓ $\frac{y - 0}{\frac{35}{17} - 3} = 4$ ✓ or $\frac{y - (-8)}{\frac{35}{17} - 1} = 4$ $y = -\frac{64}{17}$ OR / OF (2)

	Equation RQ: $y - 0 = 4(x - 3)$ $y = 4x - 12$ $= 4\left(\frac{35}{17}\right) - 12$ $= -\frac{64}{17}$ OR / OF $y + 8 = 4(x - 1)$ $y = 4x - 12$	✓ $y = 4x - 12$ ✓ $y = -\frac{64}{17}$ (2)
3.4	SE $\perp$ QR $m_{SE} = -\frac{1}{4}$ OR / OF $y - y_1 = m(x - x_1)$ $y - (-3) = -\frac{1}{4}(x - (-1))$ $y = -\frac{1}{4}x - \frac{13}{4}$ OR / OF $m_{SE} = -\frac{1}{4}$ $y - y_1 = m(x - x_1)$ $y - \left(-\frac{64}{17}\right) = -\frac{1}{4}\left(x - \frac{35}{17}\right)$ $y = -\frac{1}{4}x - \frac{13}{4}$ This answer could also be left as $4y = -x - 13$ OR / OF $4y + x + 13 = 0$ OR / OF $y = -\frac{1}{4}x + c$ $-3 = -\frac{1}{4}(-1) + c$ $c = -\frac{13}{4}$ $y = -\frac{1}{4}x - \frac{13}{4}$ OR / OF $y = -\frac{1}{4}x + c$ $-\frac{64}{17} = -\frac{1}{4}\left(\frac{35}{17}\right) + c$ $c = -\frac{13}{4}$ $y = -\frac{1}{4}x - \frac{13}{4}$	✓ $m_{SE} = -\frac{1}{4}$ ✓ subst / verv. $(-1 ; -3)$ ✓ answer / antw. OR / OF ✓ $m_{SE} = -\frac{1}{4}$ (3) ✓ subst / verv. $\left(\frac{35}{17}; -\frac{64}{17}\right)$ ✓ answer / antw. (3)
3.5	For parallel lines: / Vir parallellyne: $m_{PS} = m_{QR}$ $\frac{5 - (-3)}{a - (-1)} = 4$ $8 = 4(a + 1)$ $8 = 4a + 4$ $4a = 4$ $a = 1$ Answer only: FULL marks. Translation can be used to get the answer.	✓ $\frac{5 - (-3)}{a - (-1)}$ ✓ 4 ✓ $a = 1$ (3)
3.6.1	$m_{PS} = 4$ $\tan \theta = 4$ $\theta = 75,96^\circ$	✓ $\tan \theta = 4$ ✓ $75,96^\circ$ (2)

3.6.2	$m_{SR} = \frac{-8 - (-3)}{1 - (-1)}$ $= -\frac{5}{2}$ $\tan \beta = -\frac{5}{2}$ $= 180^\circ - 68,20^\circ$ $= 111,80^\circ$ $T\hat{S}P = 111,80^\circ - 75,96^\circ$ ext. angle of a triangle / buite hoek van 'n driehoek $= 35,84^\circ$ $\hat{R} = 35,84^\circ$ corresponding angles / ooreenstemmende hoeke PS // RQ OR / OF Draw a line RA parallel to x-axis through R / Trek 'n lyn RA parallel aan die x-as deur R $m_{QR} = m_{PS} = 4$ $\tan Q\hat{R}A = 4$ $Q\hat{R}A = 75,96^\circ$ $m_{SR} = \frac{-8 - (-3)}{1 - (-1)}$ $= -\frac{5}{2}$ $\tan S\hat{R}A = 180^\circ - 68,20^\circ$ $= 111,80^\circ$ $S\hat{R}Q = 111,80^\circ - 75,96^\circ$ $= 35,84^\circ$	$\checkmark -\frac{5}{2}$ $\checkmark \tan \beta = -\frac{5}{2}$ $\checkmark 111,80^\circ$ $\checkmark 35,84^\circ$ $\checkmark \hat{R} = 35,84^\circ \quad (5)$ OR / OF $\checkmark 4$ $\checkmark 75,96^\circ$ $\checkmark -\frac{5}{2}$ $\checkmark 111,80^\circ$ $\checkmark 35,84^\circ$ (5)
3.7	SR will be the diameter of the circle (line subt 90° angle) / $SR = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-1 - 1)^2 + (-3 + 8)^2}$ $= \sqrt{4 + 25}$ $= \sqrt{29}$ radius of circle / radius van sirkel $= \frac{\sqrt{29}}{2}$ or 2,69 OR / OF	$\checkmark \text{subst in distance formula / verv. in afstandsformule}$ $\checkmark \sqrt{29}$ $\checkmark \frac{\sqrt{29}}{2} \text{ or } 2,69$ (3) OR / OF

	SR will be the diameter of the circle (line subt 90° angle) Midpoint of SR: / <i>Middelpunt van SR</i>: $\left(\frac{1-1}{2}; \frac{-8-3}{2}\right)$ $= \left(0; -\frac{11}{2}\right)$ Radius of the circle SRE / <i>Radius van die sirkel SRE</i>: $\sqrt{(1-0)^2 + \left(-8 + \frac{11}{2}\right)^2}$ OR / OF $\sqrt{(-1-0)^2 + \left(-3 + \frac{11}{2}\right)^2}$ $RE = \sqrt{1 + \frac{25}{4}}$ $= \frac{\sqrt{29}}{2}$ OR / OF 2,69	$\sqrt{\left(0; -\frac{11}{2}\right)}$ ✓ subst in distance formula / verv. in afstandsform ✓ $\frac{\sqrt{29}}{2}$ or 2,69 (3) [22]
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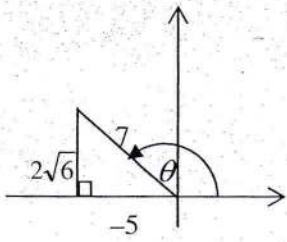
QUESTION / VRAAG 4



4.1	A(2; -2)	✓ (2; -2) (1)
4.2.1	$x^2 + y^2 + 4x - 2y + p = 0$ $x^2 + 4x + (2)^2 + y^2 - 2y + (-1)^2 = (2)^2 + (-1)^2 - p$ $(x+2)^2 + (y-1)^2 = 5 - p$ B(-2; 1)	$\begin{aligned} &\checkmark -2 \\ &\checkmark 1 \end{aligned} \quad (2)$
4.2.2	$r^2 = 5 - p$ $r = \sqrt{5 - p}$	$\begin{aligned} &\checkmark 5 - p \\ &\checkmark r = \sqrt{5 - p} \end{aligned} \quad (2)$
4.2.3	$AB = \sqrt{(-2-2)^2 + (1+2)^2}$ $= \sqrt{16+9}$ $= \sqrt{25}$ $= 5$ OR / OF $AB = \sqrt{(2+2)^2 + (-2-1)^2}$	$\begin{aligned} &\checkmark \text{subst. / verv.} \\ &\quad (2; -2) \text{ \& } (-2; 1) \text{ into} \\ &\quad \text{distance formula /} \\ &\quad \text{afstandsformule} \\ &\checkmark 5 \end{aligned} \quad (2)$
4.2.4	$AB = R + r$ $5 = 2 + \sqrt{5 - p}$ $3 = \sqrt{5 - p}$ $9 = 5 - p$ $p = -4$	$\begin{aligned} &\checkmark R + r = 2 + \sqrt{5 - p} \\ &\checkmark 5 = 2 + \sqrt{5 - p} \\ &\checkmark p = -4 \end{aligned} \quad (3)$

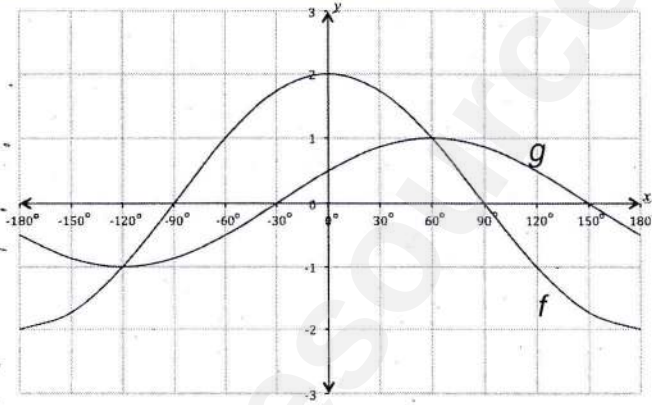
4.3	$m_{AT} = \frac{-2 + \frac{4}{5}}{2 - \frac{2}{5}}$ $= \frac{-\frac{6}{5}}{\frac{8}{5}}$ $= -\frac{3}{4}$ OR / OF $m_{AB} \times m_{\text{tangent}} = -1$ $m_{\text{tang}} = \frac{4}{3}$ $y + \frac{4}{5} = \frac{4}{3} \left(x - \frac{2}{5} \right)$ $y + \frac{4}{5} = \frac{4}{3}x - \frac{8}{15}$ $y = \frac{4}{3}x - \frac{4}{3}$ OR / OF A: $x^2 - 4x + 4 + y^2 + 4y + 4 = 4$ $x^2 - 4x + y^2 + 4y = -4$ B: $x^2 + 4x + y^2 - 2y = 4$ A - B: $-8x + 6y = -8$ $y = \frac{4}{3}x - \frac{4}{3}$	✓ sub (2 ; -2) and $\left(\frac{2}{5}; -\frac{4}{5} \right)$ OR / OF sub / verv. (-2;1) and $\left(\frac{2}{5}; -\frac{4}{5} \right)$ into gradient / formula / in gradiënt formula ✓ $-\frac{3}{4}$ ✓ $m_{\text{tang}} = \frac{4}{3}$ ✓ sub $\left(\frac{2}{5}; -\frac{4}{5} \right)$ ✓ $y = \frac{4}{3}x - \frac{4}{3} \quad (5)$ OR / OF ✓ $x^2 - 4x + 4 + y^2 + 4y + 4 = 4$ ✓ $x^2 - 4x + y^2 + 4y = -4$ ✓ $-8x + 6y = -8$ ✓✓ $y = \frac{4}{3}x - \frac{4}{3} \quad (5)$ [15]
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QUESTION / VRAAG 5

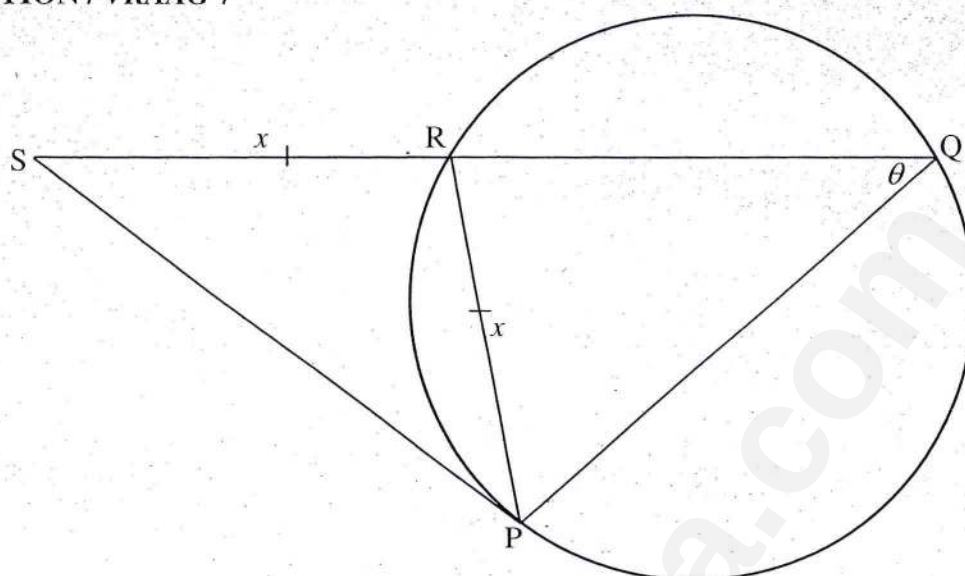
5.1.1	$\tan \theta = -\frac{2\sqrt{6}}{5}$  $r^2 = (2\sqrt{6})^2 + (-5)^2 \text{ Pyth}$ $= 49$ $\therefore r = 7$ $\sin \theta = \frac{2\sqrt{6}}{7}$	$\checkmark r = 7$ $\checkmark \sin \theta = \frac{2\sqrt{6}}{7} \quad (2)$
5.1.2	$\cos \theta = -\frac{5}{7}$	$\checkmark \cos \theta = -\frac{5}{7} \quad (1)$
5.1.3	$\frac{14 \cos \theta + 7\sqrt{6} \sin \theta}{\cos(-240^\circ) \cdot \tan 225^\circ}$ $= \frac{14\left(-\frac{5}{7}\right) + 7\sqrt{6}\left(\frac{2\sqrt{6}}{7}\right)}{(\cos 240^\circ)(\tan 225^\circ)}$ $= \frac{-10 + 12}{(-\cos 60^\circ)(\tan 45^\circ)}$ $= \frac{2}{\left(-\frac{1}{2}\right)(1)}$ $= -4$	$\checkmark -\cos 60^\circ$ $\checkmark \tan 45^\circ$ $\checkmark -\frac{1}{2} \text{ and } 1$ $\checkmark -4 \quad (4)$
5.2	$\frac{\cos \theta - \cos 2\theta + 2}{3 \sin \theta - \sin 2\theta}$ $= \frac{\cos \theta - (2 \cos^2 \theta - 1) + 2}{3 \sin \theta - 2 \sin \theta \cos \theta}$ $= \frac{\cos \theta - 2 \cos^2 \theta + 1 + 2}{\sin \theta (3 - 2 \cos \theta)}$ $= \frac{3 + \cos \theta - 2 \cos^2 \theta}{\sin \theta (3 - 2 \cos \theta)}$ $= \frac{(3 - 2 \cos \theta)(1 + \cos \theta)}{\sin \theta (3 - 2 \cos \theta)}$ $= \frac{1 + \cos \theta}{\sin \theta}$ $= \text{RHS}$	$\checkmark 2 \cos^2 \theta - 1$ $\checkmark 2 \sin \theta \cdot \cos \theta$ $\checkmark 3 + \cos \theta - 2 \cos^2 \theta$ $\checkmark (3 - 2 \cos \theta)(1 + \cos \theta)$ $\checkmark \frac{1 + \cos \theta}{\sin \theta} \quad (5)$

5.3	$\sin \theta \sin \frac{3\theta}{2} + \cos \frac{3\theta}{2} \cos \theta = -\frac{\sqrt{3}}{2}$ $\cos \frac{3\theta}{2} \cos \theta + \sin \frac{3\theta}{2} \sin \theta = -\frac{\sqrt{3}}{2}$ $\cos \left(\frac{3\theta}{2} - \theta \right) = -\frac{\sqrt{3}}{2}$ $\cos \left(\frac{\theta}{2} \right) = -\frac{\sqrt{3}}{2}$ $\frac{\theta}{2} = 150^\circ + k \cdot 360^\circ \quad k \in \mathbb{Z} \quad \text{or / of} \quad \frac{\theta}{2} = -150^\circ + k \cdot 360^\circ \quad k \in \mathbb{Z}$ $\theta = 300^\circ + k \cdot 720^\circ \quad k \in \mathbb{Z} \quad \theta = -300^\circ + k \cdot 720^\circ \quad k \in \mathbb{Z}$ OR / OF ref $\angle = 30^\circ$ $\frac{\theta}{2} = 180^\circ - 30^\circ + k \cdot 360^\circ \quad \text{or / of} \quad \frac{\theta}{2} = 180^\circ + 30^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $\theta = 300^\circ + k \cdot 720^\circ \quad \text{or / of} \quad \theta = 420^\circ + k \cdot 720^\circ$	$\checkmark \cos \left(\frac{3\theta}{2} - \theta \right)$ $\checkmark \frac{\theta}{2} = \pm 150^\circ + k \cdot 360^\circ$ $\checkmark \theta = 300^\circ + k \cdot 720^\circ$ $\checkmark \theta = -300^\circ + k \cdot 720^\circ$ (4) OR / OF $\checkmark \frac{\theta}{2} = 180^\circ \pm 30^\circ + k \cdot 360^\circ$ $\checkmark 300^\circ + k \cdot 720^\circ$ $\checkmark 420^\circ + k \cdot 720^\circ$ (4)
5.4.1	Maximum value is 1 and minimum value is -1 / <i>Maksimum waarde is 1 en minimum waarde -1</i>	$\checkmark \text{answer / antw.}$ (1)
5.4.2	Range of both graphs is $-1 \leq y \leq 1$ $\sin \theta \cdot \cos \beta = -1$ $\sin \theta = 1$ and / en $\cos \beta = -1$ or / of $\sin \theta = -1$ and / en $\cos \beta = 1$ $\theta = 90^\circ$ and / en $\beta = -180^\circ$ or $\theta = 270^\circ$ and / en $\beta = 90^\circ$	$\checkmark \theta = 90^\circ$ $\checkmark \beta = -180^\circ$ $\checkmark \theta = 270^\circ$ $\checkmark \beta = 90^\circ$ (4) [21]

QUESTION / VRAAG 6

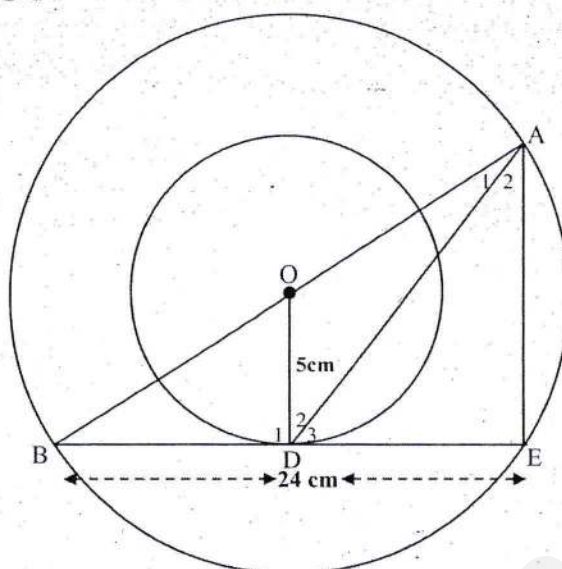
6.1	$2 \cos x = \sin(x + 30^\circ)$ $2 \cos x = \sin x \cos 30^\circ + \cos x \sin 30^\circ$ $2 \cos x = \sin x \left(\frac{\sqrt{3}}{2} \right) + \cos x \left(\frac{1}{2} \right)$ $4 \cos x = \sqrt{3} \sin x + \cos x$ $3 \cos x = \sqrt{3} \sin x$	$\checkmark \sin x \cos 30^\circ + \cos x \sin 30^\circ$ $\checkmark \frac{\sqrt{3}}{2} \text{ and / en } \frac{1}{2}$ $\checkmark 4 \cos x = \sqrt{3} \sin x + \cos x$ (3)
6.2	$\frac{3 \cos x}{\cos x} = \frac{\sqrt{3} \sin x}{\cos x}$ $\tan x = \sqrt{3}$ $\text{ref } \angle = 60^\circ$ $x = 60^\circ + k \cdot 360^\circ \text{ OR / OF } x = 240^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $\therefore x = \{-120^\circ; 60^\circ\}$	$\checkmark \tan x = \sqrt{3}$ $\checkmark \text{ref angle / verw. hoek}$ $\checkmark -120^\circ$ $\checkmark 60^\circ$ (4)
6.3.1	$y \in [-2; 2] \quad \text{OR / OF } -2 \leq y \leq 2$	$\checkmark y \in [-2; 2]$ (1)
6.3.2		$\checkmark x\text{-intercepts}$ $\checkmark y\text{-intercept}$ $\checkmark \text{shape}$ (3)
6.3.3	360°	$\checkmark 360^\circ$ (1)
6.3.4	$-120^\circ < x < 60^\circ \quad \text{OR / OF } x \in (-120^\circ; 60^\circ)$	$\checkmark -120^\circ < x$ $\checkmark x < 60^\circ$ (2)
6.3.5	$-30^\circ < x < 90^\circ \quad \text{OR / OF } x \in (-30^\circ; 90^\circ)$ Brackets/ Inequality signs have to be correct.	$\checkmark -30^\circ < x$ $\checkmark x < 90^\circ$ (2) [16]

QUESTION / VRAAG 7



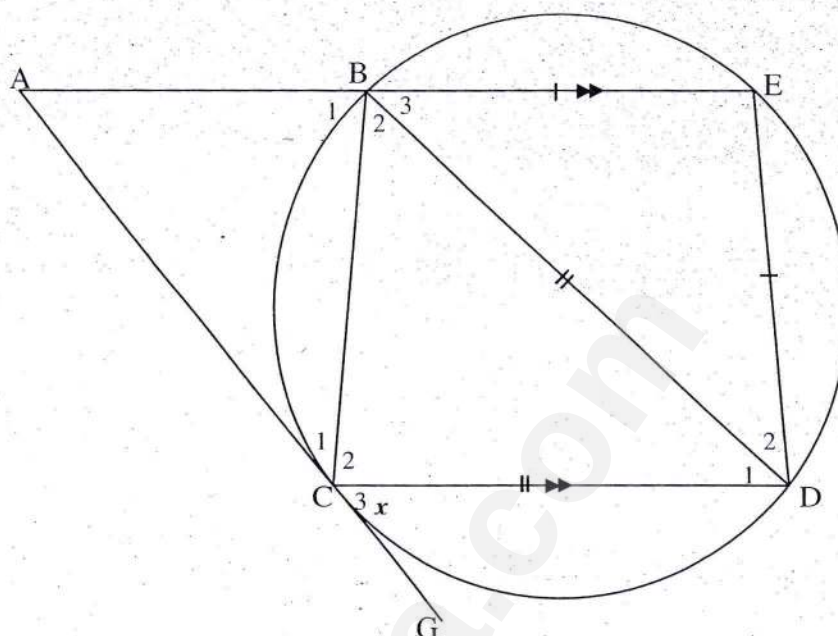
7.	$\hat{SPR} = \theta$ [tan-chord / raaklyn-koord] $\hat{R} = 180^\circ - 2\theta$ [sum $\angle^s$ of Δ / som $\angle^e$ van Δ] $PS^2 = x^2 + x^2 - 2x^2 \cos(180^\circ - 2\theta)$ $= 2x^2 + 2x^2 \cos 2\theta$ $= 2x^2(1 + \cos 2\theta)$ $= 2x^2(1 + 2\cos^2 \theta - 1)$ $= 2x^2(2\cos^2 \theta)$ $= 4x^2 \cos^2 \theta$ $PS = 2x \cos \theta$ OR / OF $PS^2 = x^2 + x^2 - 2x^2 \cos(180^\circ - 2\theta)$ $= 2x^2 + 2x^2 \cos 2\theta$ $= 2x^2(1 + \cos 2\theta)$ $= 2x^2(1 + 1 - 2\sin^2 \theta)$ $= 2x^2(2 - 2\sin^2 \theta)$ $= 4x^2(1 - \sin^2 \theta)$ $= 4x^2 \cos^2 \theta$ $PS = 2x \cos \theta$	$\checkmark \hat{SPR} = \theta$ $\checkmark \hat{R} = 180^\circ - 2\theta$ $\checkmark x^2 + x^2 - 2x^2 \cos(180^\circ - 2\theta)$ $\checkmark + 2x^2 \cos 2\theta$ $\checkmark 2\cos^2 \theta - 1$ $\checkmark 4x^2 \cos^2 \theta$ (6) OR / OF $\checkmark x^2 + x^2 - 2x^2 \cos(180^\circ - 2\theta)$ $\checkmark + 2x^2 \cos 2\theta$ $\checkmark 1 - 2\sin^2 \theta$ $\checkmark 4x^2 \cos^2 \theta$ (6) [6]
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QUESTION / VRAAG 8



8.1	bisects / halveer	✓ answ/antw. (1)
8.2.1	$OD \perp BE$ ($\hat{D}_1 = \hat{D}_2 + \hat{D}_3 = 90^\circ$) $\therefore BD = DE = 12\text{cm}$ $OB^2 = 12^2 + 5^2$ $= 169$ $OB = 13\text{cm}$	[$\tan \perp$ radius / raaklyn $\perp$ radius] [line from centre $\perp$ to chord / Loodlyn uit midpt. O na koord] [Pyth; $\hat{D}_1 = 90^\circ$] ✓ S/R ✓ S/R ✓ $OB^2 = 12^2 + 5$ ✓ $OB = 13$ (4)
8.2.2	$\hat{E} = 90^\circ$ [$\angle$ in semi $\odot$ / $\angle$ in halwe $\odot$] OR [corresp $\angle$ s; $DO \parallel AE$ / ooreenk. $\angle$ s; $DO \parallel AE$]	✓ R (1)
8.2.3	$OD \parallel AE$ and/ en $BD = DE$ $AE = 2OD$ $= 10$ OR / OF $OB = OA$ $AB = 26$ In $\triangle ABE$ $AE^2 = 26^2 - 24^2$ $= 100$ $AE = 10$	[Midpt Theorem / Midpt.-stelling] [radii] [Pyth; $\hat{E} = 90^\circ$] ✓ S/R ✓ $AE = 2OD$ ✓ $AE = 10$ (3) OR / OF ✓ $AB = 26$ ✓ S/R ✓ $AE = 10$ (3)
8.2.4	In $\triangle ADE$ $AD^2 = 10^2 + 12^2$ $= 244$ $AD = \sqrt{244}$ OR / OF $2\sqrt{61}$ OR / OF 15,62	[Pyth; $\hat{E} = 90^\circ$] ✓ S/R ✓ $AD = \sqrt{244}$ OR / OF $2\sqrt{61}$ OR / OF 15,62 (2) [11]

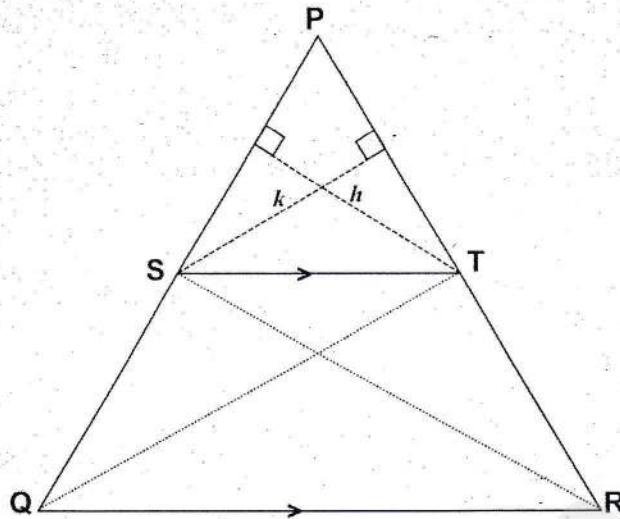
QUESTION / VRAAG 9



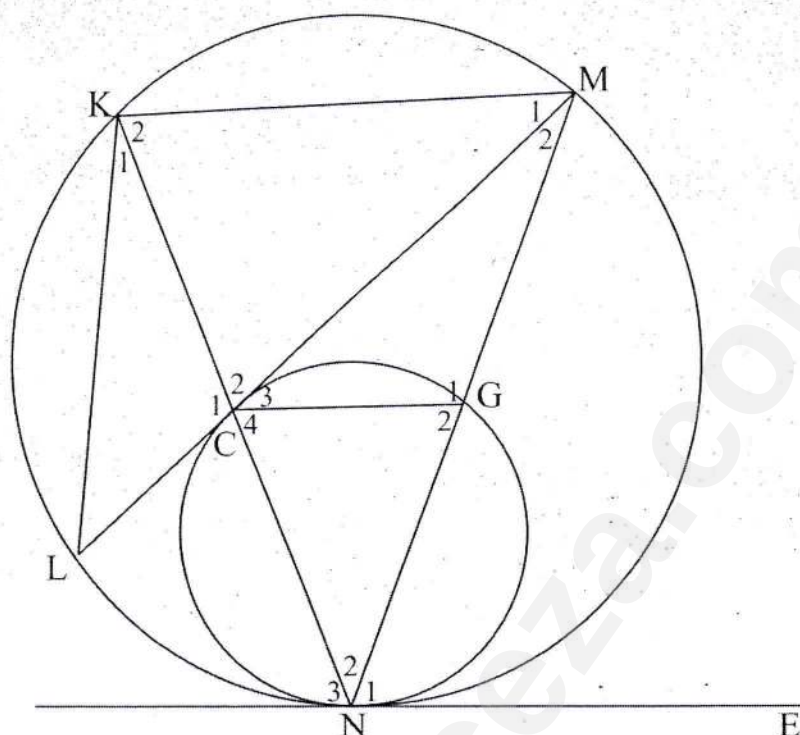
9.1	$x = \hat{C}_3$ $= \hat{B}_2$ $= \hat{C}_2$ $= \hat{B}_1$ $= \hat{D}_1 + \hat{D}_2$ $\hat{C}_3 = \hat{A} = x$	[given / gegee] [tan chord theorem / $\angle$ tussen raaklyn en koord] [$\angle$ s opp equal sides / $\angle$ e teenoor gelyke sye] [alt $\angle$ s; $BE \parallel CD$ / verw. $\angle$ e; $BE \parallel CD$] [ext $\angle$ of cyclic quad / buite $\angle$ van kvh] [corresp $\angle$ s; $BE \parallel CD$ / ooreenk. $\angle$; $BE \parallel CD$]	✓ S ✓ R ✓ S/R ✓ S/R ✓ S ✓ R ✓ S/R	(7)
9.2	$\hat{B}_3 = \hat{D}_1$ $ED = BC$ OR / OF In ΔBCD and/en ΔEDC $CD = CD$ $\hat{C}_2 = \hat{E}DC = x$ $\hat{B}_2 = \hat{C}ED$ $\Delta BCD \equiv \Delta EDC$ $ED = BC$	[alt $\angle$ s; $BE \parallel CD$ / verw. $\angle$ e; $BE \parallel CD$] [equal $\angle$ s ; equal chords gelyke omtr $\angle$ e; gelyke koorde] [common / gemeenskaplik] [proven in 9.1 / bewys in 9.1] [$\angle$ s in the same seg / $\angle$ e in dies. $\odot$ segm. [AAS OR $\angle$ LS / HHS OF $\angle$ LS] [from $\equiv$ / uit $\equiv$]	✓ S/R ✓ S/R OR / OF ✓ S/R for all three angles/ vir al drie hoeke ✓ S/R	(2) (2)

[9]

QUESTION / VRAAG 10



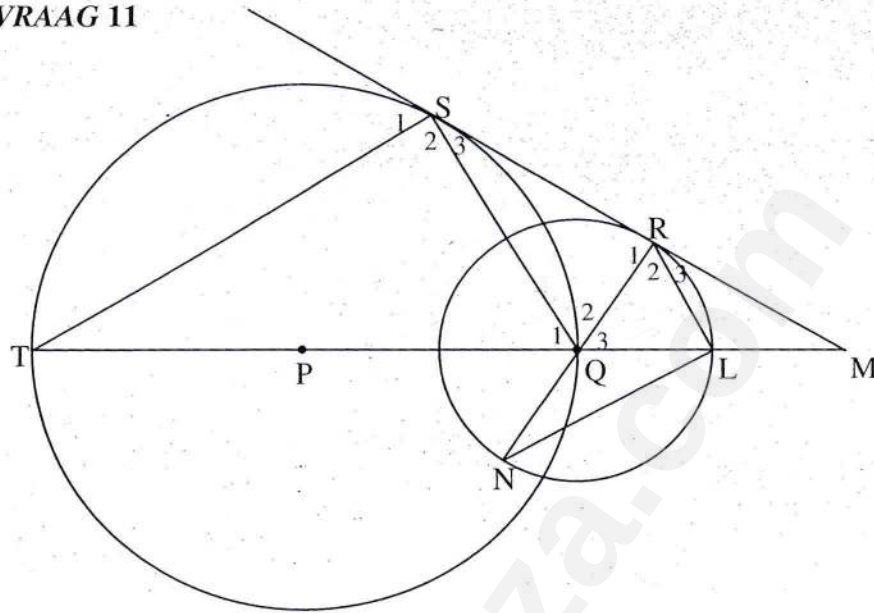
10.1	Construction: In $\triangle PQR$, draw height h relative to base PS and the height k relative to base PT. Join QT and RS to form $\triangle SQT$ and $\triangle TRS$. $\frac{\text{Area of } \triangle PST}{\text{Area of } \triangle SQT} = \frac{\frac{1}{2} \times PS \times h}{\frac{1}{2} \times SQ \times h} = \frac{PS}{SQ}$ $\frac{\text{Area of } \triangle PTS}{\text{Area of } \triangle TRS} = \frac{\frac{1}{2} \times PT \times k}{\frac{1}{2} \times TR \times k} = \frac{PT}{TR}$ But Area $\triangle SQT$ = Area $\triangle TRS$ $\frac{\text{Area of } \triangle PST}{\text{Area of } \triangle SQT} = \frac{\text{Area of } \triangle PTS}{\text{Area of } \triangle TRS}$ $\frac{PS}{SQ} = \frac{PT}{TR}$ [same base, equal height OR same base, $ST \parallel QR$ /dies. basis ; gelyke hoogte OF dies. basis, $ST \parallel QR$]	✓ Construction on sketch/ Konstruksie op skets ✓ S ✓ S ✓ S/R ✓ S (5)
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10.2.1	$\hat{N}_1 = \hat{C}_4$ $\hat{N}_1 = \hat{K}_2$ $\therefore \hat{C}_4 = \hat{K}_2$ $CG \parallel KM$ $\frac{KC}{KN} = \frac{MG}{MN}$	[tan chord theorem / <i>∠tussen raaklyn en koord</i>] [tan chord theorem / <i>∠tussen raaklyn en koord</i>] [corresp $\angle$ s = <i>looreenk. ∠ gelyk</i>] [line $\parallel$ one side of Δ OR prop theorem; $CG \parallel KM$ / <i>lyn $\parallel$ een sy van Δ</i>]	$\checkmark$ S / R $\checkmark$ S / R $\checkmark$ S / R $\checkmark$ R	(4)
10.2.2	$\hat{C}_4 = \hat{K}_2$ $\hat{C}_4 = \hat{G}_2$ $\therefore \hat{G}_2 = \hat{K}_2$ $\therefore$ KMGC is a cyclic quad	proved [$\angle$ s opp equal sides / <i>∠ teenoor gelyke sye</i>] [ext $\angle$ = int opp $\angle$ / <i>buite hoek = oorst binne ∠</i>]	$\checkmark \hat{C}_4 = \hat{G}_2$ $\checkmark$ R $\checkmark$ R	(3)
10.2.3	In Δ MCG and/en Δ MNC $\hat{M}_2 = \hat{M}_2$ $\hat{C}_3 = \hat{N}_2$ $\hat{G}_1 = \hat{C}_3 + \hat{C}_4$ Δ MCG $\parallel \parallel$ Δ MNC	[common / <i>gemeenskaplik</i>] [tan chord theorem / <i>∠tussen raaklyn en koord</i>] [$\angle$ sum in Δ / <i>∠ som van Δ</i>] [$\angle \angle \angle$]	$\checkmark$ S $\checkmark$ S / R $\checkmark$ R	(3)

10.2.4	$\frac{MC}{MG} = \frac{MN}{MC}$ $MC^2 = MG \cdot MN$ $\frac{MC^2}{MN^2} = \frac{MG \cdot MN}{MN^2}$ $= \frac{MG}{MN}$ $\frac{KC}{KN} = \frac{MG}{MN}$ $\frac{MC^2}{MN^2} = \frac{KC}{KN}$	$[\Delta^s \parallel \parallel / \Delta^e \parallel \parallel]$ [proved / bewys]	$\checkmark$ S/R $\checkmark$ S $\checkmark$ S $\checkmark$ S
			(4) [19]

QUESTION / VRAAG 11



11.1	$\hat{Q}_3 = 2\hat{N}$ $\hat{N} = 30^\circ$ $\hat{N} = \hat{R}_3$ $\hat{R}_3 = 30^\circ$	$[\angle \text{ at centre} = 2 \times \angle \text{ at circ / middelpnts } \angle = 2 \times \text{omtrek } \angle]$ {tan chord theorem / $\angle$ tussen raaklyn en koord]	$\checkmark$ Reason $\checkmark \hat{N} = 30^\circ$ $\checkmark$ Reason $\checkmark \hat{R}_3 = 30^\circ$ (4)
11.2	$\Delta TSQ \parallel \Delta SRQ$ $\frac{TS}{SR} = \frac{SQ}{RQ} = \frac{TQ}{SQ}$ $SQ^2 = TQ \cdot RQ$ $= 4r \cdot r$ $= 4r^2$ $SQ = 2r$ OR / OF $PQ = 2r$ $\therefore TQ = 4r$ $\frac{SQ}{RQ} = \frac{TQ}{SQ}$ $SQ^2 = TQ \cdot RQ$ $= 4r^2$ $SQ = 2r$	$[\Delta^s \parallel / \Delta^e \parallel]$	$\checkmark \frac{SQ}{RQ} = \frac{TQ}{SQ}$ $\checkmark TQ = 4r$ $\checkmark SQ^2 = 4r^2$ (3) OR / OF $\checkmark TQ = 4r$ $\checkmark \frac{SQ}{RQ} = \frac{TQ}{SQ}$ $\checkmark SQ^2 = 4r^2$ (3)

11.3	$\hat{Q}_1 = \hat{Q}_2$ $\hat{Q}_1 = 60^\circ$ $\hat{S}_2 = 90^\circ$ $\hat{T} = 30^\circ$ $\hat{S}_3 = 30^\circ$ $\hat{T}\hat{S}R = 120^\circ$ OR / OF $\sin \hat{S}_3 = \frac{RQ}{SQ}$ $= \frac{r}{2r}$ $= \frac{1}{2}$ $\hat{S}_3 = 30^\circ$ $\hat{S}_2 = 90^\circ$ $\hat{T}\hat{S}R = \hat{S}_3 + \hat{S}_2$ $= 120^\circ$	$[\Delta^s \parallel / \Delta^e \parallel]$ $[\angle^s \text{ on str line} / \angle^e \text{ op rt.lyn}]$ $[\angle \text{ in semi-circle} / \angle \text{ in semi-sirkel}]$ $[\text{sum } \angle^s \text{ of } \Delta / \text{som } \angle^e \text{ van } \Delta]$ $[\text{tan chord theorem} / \angle \text{ tussen raaklyn en koord}]$ $[\angle \text{ in semi-circle} / \angle \text{ in semi-sirkel}]$	$\checkmark \hat{Q}_1 = 60^\circ$ $\checkmark \hat{S}_2 = 90^\circ$ $\checkmark \hat{T} = 30^\circ$ $\checkmark \text{S/R}$ $\checkmark \hat{T}\hat{S}R = 120^\circ$ OR / OF $\checkmark \sin \hat{S}_3 = \frac{1}{2}$ $\checkmark \hat{S}_3 = 30^\circ$ $\checkmark \text{S/R}$ $\checkmark \hat{T}\hat{S}R = 120^\circ$
			(4)
			(4)
			[11]

TOTAL / TOTAAL: 150